



Slide 1

 Washington State Department of
Labor & Industries

Formaldehyde

Training on the hazards of
formaldehyde in the workplace



Developed by the Division of Occupational Safety & Health (DOSH)
for employee training
November, 2011

Formaldehyde

What this training will cover

Where formaldehyde is used

Health hazards of formaldehyde

Controlling your exposure to formaldehyde

Personal protective equipment for formaldehyde

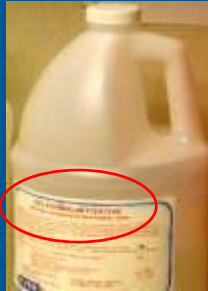
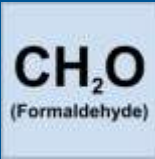
Medical monitoring if you are exposed to formaldehyde

What is Formaldehyde?

Formaldehyde is a colorless, flammable, strong-smelling chemical widely used to make resins for plywood, particle board, pressed wood products and in paper coatings, glues, plastics, and textile finishes.

It is also commonly used as a preservative in medical laboratories, mortuaries, veterinary clinics and in some hair straightening products.

It is often mixed with water to make a liquid called "formalin" which contains 37 % formaldehyde and 6% - 13% methanol.



3

"Although formaldehyde exists as a gas, most use is with formalin where formaldehyde is mixed with water. However formaldehyde gas is emitted out of the formalin solution and levels can exceed permissible limits in unventilated rooms or areas. It can also be found in a powder form called "paraformaldehyde". Formaldehyde is sometimes called "methaldehyde".

Slide 4

Workplaces in Washington state where formaldehyde is used



Funeral homes and mortuaries – as embalming fluid

Medical labs – tissue preservation and histology

Veterinary hospitals & clinics – tissue preservation

Beauty shops – in some hair straightening products (may not be listed on product label)

[Hazard Alert: What hair stylists need to know about formaldehyde in hair-straightening products](#)



4

“Formaldehyde is also used in some dental offices and in urea-formaldehyde wood glues.”

Slide 5

Formaldehyde in our workplace

[List locations where formaldehyde or formalin is stored or used]




The slide contains three photographs illustrating formaldehyde use in a workplace. The top-left photo shows a blue plastic container with a red circle highlighting a label. The bottom-left photo shows a small, clear plastic jar with a red circle highlighting a label. The right photo shows a large orange bottle of Dodge Plasto-25, with a red circle highlighting a label that includes the text 'FORMALDEHYDE'.


5

[Employer: photos are examples of formaldehyde use. You can delete these and substitute photos of your own, or simply list where formaldehyde or formalin is stored and used.]

Health Hazards of Formaldehyde



- Cancer hazard – mainly nose and throat and lungs
- Eye, nose and throat irritation
- Respiratory system sensitizer
- Skin irritation



6

“Formaldehyde vapors irritate the eyes, leading to watery eyes, burning sensations, redness and itching. If you get formaldehyde liquids in your eyes, you may suffer from corneal opacity, scarring and even blindness.

Minor skin problems caused by formaldehyde include dryness, cracking and skin rashes.

Formaldehyde results in dry, irritated skin because it strips away your skin's natural protective oils. In addition to minor irritations, liquid formaldehyde and formaldehyde vapors may lead to allergic skin reactions. Symptoms include hives, edema and erythema, or red, tender lumps.”




Formaldehyde is extremely toxic

Short term exposures to high levels of formaldehyde can be fatal at levels as low as 100 parts per million (.01%) in air.

3 to 5 parts per million in air causes eye tearing and is intolerable to some people.

Some people have developed asthma or bronchitis following a single exposure to high levels of formaldehyde in the air from an accidental spill.

Some people are very sensitive to formaldehyde, whereas others have no reaction to the same level of exposure.



7

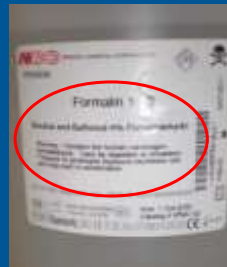
“Normally, reactions to formaldehyde end within days or a few weeks of the cessation of exposure. Most people become acclimated to formaldehyde and come to experience its effects more mildly. But some people, especially those with allergic asthma, allergic hay fever, or infantile or childhood eczema, become sensitized and suffer a condition known as allergic contact dermatitis. Those with allergic contact dermatitis suffer itching, redness, swelling, multiple small blisters and scaling whenever subsequent exposure occurs. Sensitized individuals are usually unable to remain in formaldehyde-related jobs.”

Formaldehyde Cancer Hazard

Formaldehyde exposure has been associated with cancer of the nose and pharynx (throat) in humans.

Formaldehyde caused cancer in rats in laboratory tests.

Formaldehyde has recently been associated with a risk of leukemia, more likely with higher and longer exposure.



Health Effects as listed in Formaldehyde Standard

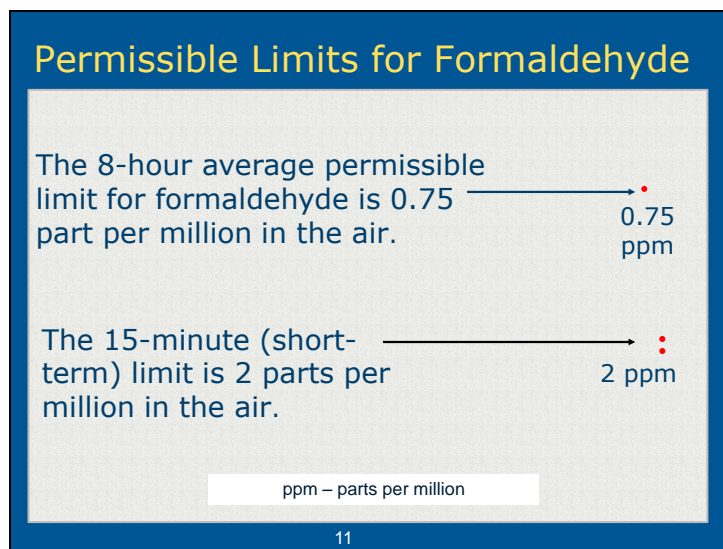
Table HT-1 Acute Health Effects of Formaldehyde Exposure	
Type of contact	Health Effects
Ingestion (swallowing)	Liquids containing 10% to 40% formaldehyde cause severe irritation and inflammation of the mouth, throat, and stomach. Severe stomach pains will follow ingestion with possible loss of consciousness and death.
	Ingestion of dilute formaldehyde solutions (0.03% to 0.04%) may cause discomfort in the stomach and pharynx.
Inhalation (breathing)	Formaldehyde is highly irritating to the upper respiratory tract and eyes.
	0.5 to 2.0 parts per million (ppm) may irritate the eyes, nose, and throat of some individuals.
	3 to 5 ppm also cause tearing of the eyes and are intolerable to some persons.
	10 to 20 ppm cause difficulty in breathing, burning of the nose and throat, coughing, and heavy tearing of the eyes.
	25 to 30 ppm causes severe respiratory tract injury leading to inflammation and accumulation of fluid in the lung.
	100 ppm is immediately dangerous to life and health. Deaths from accidental exposure to high concentrations of formaldehyde have been reported.

9

“This table of health effects is from the Formaldehyde standard and covers all possible health effects except cancer. More on the next slide.”

Health Effects as listed in Formaldehyde Standard (continued)	
Table HT-1 Acute Health Effects of Formaldehyde Exposure	
Type of contact	Health Effects
Skin	Formaldehyde is a severe skin irritant and a sensitizer.
	Contact with Formaldehyde causes white discoloration, smarting, drying, cracking, and scaling.
	Prolonged and repeated contact can cause numbness and a hardening or tanning of the skin.
	Previously exposed persons may react to future exposure with an allergic eczematous dermatitis or hives.
Eye	Formaldehyde solutions splashed in the eye can cause injuries ranging from transient discomfort to severe, permanent corneal clouding and loss of vision.
	The severity of the effect depends on the concentration of formaldehyde in the solution and if the eyes are flushed with water immediately after the incident.

“This is a continuation of the previous slide on the health effects of formaldehyde.”



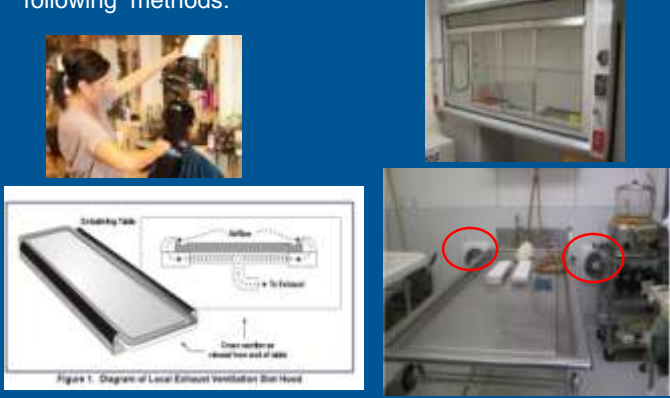
“Imagine for a moment there are 1 million molecules or dots of air in this slide. The red dot represents approximately one molecule or dot of formaldehyde in the slide. Actually, it would be much smaller.

DOSH has two permissible limits – 0.75 ppm averaged over 8 hours, but no more than 2 ppm in any 15 minute interval. These are the limits of formaldehyde allowed in the air you breathe at work. The first is called the “time-weighted average” or “TWA”, the second is called a “short term exposure limit” or “STEL. Suffice it to say, both are very small amounts of formaldehyde in the air. The permissible limit is set really low to prevent cancer and sensitization in susceptible individuals.

Most people will begin to smell the pungent odor of formaldehyde at around 1 ppm in the air, but the odor becomes less apparent over time. Therefore, the odor is not a good way of knowing if you are exposed to formaldehyde above the permissible limit.”

How We Control Your Exposure to Formaldehyde

We reduce or control your exposure to formaldehyde by the following methods:




The collage consists of four images. Top left: A person in a mortuary setting. Top right: A laboratory hood. Bottom left: A diagram of a local exhaust ventilation table with labels: 'Suctioning Table', 'Airflow', 'To Exhaust', and 'Cross ventilation or exhaust from end of table'. Bottom right: A photograph of a mortuary table with two red circles highlighting exhaust fans. Below the diagram is the caption: 'Figure 1. Diagram of Local Exhaust Ventilation Suctioning Table'.

12

“The photos shows two example of exhaust ventilation in a mortuary to remove formaldehyde vapors, an example of ventilation during hair straightening, and a lab hood. Our methods of reducing your exposure to formaldehyde are as follows: [describe your company’s methods – photos shown can be deleted and your photos inserted.]

Eyewash for Formaldehyde

A formaldehyde or formalin splash to the eyes can be very damaging. We provide an eyewash within 50 feet or 10 seconds travel time of the location where formalin is handled. Our eyewash(s) are found at the following locations:




Not acceptable as eyewash

13

“We are required to provide an eyewash if you work with any product containing formaldehyde in an amount of 0.1 % or greater.”

[Employers: some faucet –mounted eyewashes are not acceptable eyewashes because they will take more than one second to activate. Activation of an eyewash must be immediate (less than 1 second) and the water temperature cannot be too hot. Photo show examples of acceptable and non-acceptable eyewashes and can be deleted with photo of your eyewashes inserted.]

Emergency Showers for Formaldehyde



Our emergency shower(s) are found in the following location(s):

14




The slide features a blue background. At the top, the title 'Emergency Showers for Formaldehyde' is written in yellow. Below the title, on the left, is a cartoon illustration of a person standing under a shower head with water spraying. To the right of the illustration is a photograph of a real emergency shower unit, which is a tall, narrow, white cabinet with a shower head at the top and a control panel on the side. Below the images, the text 'Our emergency shower(s) are found in the following location(s):' is written in white. At the bottom center, the number '14' is displayed in white.

[employer: optional slide if you provide emergency showers] An emergency shower is required if you work with any products containing 1% or more formaldehyde and a splash to the skin could occur

Air Monitoring for Formaldehyde

Our air monitoring for formaldehyde is done as outlined below:

Detector tubes



Formaldehyde gas badges

15

[Employer: optional slide if you actually do air monitoring for formaldehyde. The air monitoring “gas badges” in the photos are a common and cost-effective way of air monitoring for formaldehyde. Detector tubes is another cost effective method. You can also list results of your air monitoring here.]



If respirators are needed:

The type of respirator needed depends on the amount of formaldehyde in the air.

A cartridge-type respirator can be used for low levels of formaldehyde.

For higher levels, a supplied air respirator is needed.

We will give you the proper type of respirator and provide respirator program training.



16

“In certain areas or work situations, we cannot reduce the amount of formaldehyde in the air below the permissible exposure limit. [describe, if have them] In those cases, respirators are required to be worn if the amount in the air is more than the Permissible Exposure Limit (PEL). Paper dust masks do not filter out formaldehyde. Either cartridge type respirators or respirators that supply clean air must be worn, depending on the levels of formaldehyde in the air. Cartridge type respirators like the top photo must have cartridges that capture “organic vapors” which includes formaldehyde. You can identify it by the black strip as well as the wording. The cartridges must be replaced on a regular basis. [describe your replacement schedule if you have one]. A full face respirator is recommend [or we provide it] since formaldehyde vapors are irritating to the eyes. You would need a supplied air respirator like the lower photo, if the amount of formaldehyde in the air is above 7.5 ppm, an unlikely occurrence except when there was a major spill of a large amount of formalin in an enclosed space or smaller room.”

Using Cartridge Respirators

Respirators must be worn at all times when the amount of formaldehyde in the air is above the permissible limit.

Because formaldehyde is irritating to the eyes, either a full face respirator or half-face respirator with goggles must be worn.

Respirators must fit properly to prevent leaks.

You must have a medical evaluation before you wear a respirator.



Full-face respirator



Half-face respirator

“Taking your respirator off just for minute can overexpose you to formaldehyde in the air. Respirators are only as good as they fit. If they leak, you will have a false sense of protection. A special respirator usage medical evaluation is required because respirators themselves cause some stress to the body, especially if a person has lung or heart problems. This medical evaluation starts with a medical questionnaire and is separate from the medical evaluations required for formaldehyde.”

Respirators Must Fit Properly

You must have a respirator fit-test before you wear a respirator.



You can't have a beard or other facial hair when wearing a tight-fitting respirator.



We will train you on how to use your respirator.

18

"A beard, facial hair, side burns and moustaches can interfere with sealing surface of the respirator and prevents a tight fit. Even a day's growth may cause leakage. You must be clean shaven to wear a tight-fitting respirator. As mentioned before, although formaldehyde has an strong odor, most people can smell it only at levels above the permissible limit. So if you had a leak in your respirator because of facial hair, you may not notice it by odor. We will cover the use of respirators in separate training."

[Employer: If your employees wear respirators, they will need further training on their use, limitations and maintenance.]

Slide 19

**Skin and eye protection needed
when handling formaldehyde**


We require the use of the following gloves and eye protection when you are handling formalin solutions:



19

[Employer: photos are examples only. You can substitute your own photos or simply list what skin and eye protection you provide. Please note that faceshields alone cannot be used for eye protection for formaldehyde.]

Exposure Control Areas

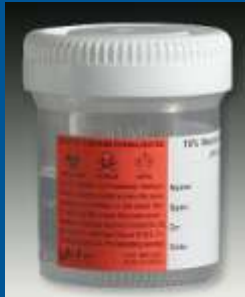


When the amount of formaldehyde in the air exceeds the permissible limits, we will or have clearly marked exposure control areas where only certain worker can enter or work and must wear respirators.

20

[Employer: optional slide if you have established permanent or temporary exposure control areas] “We have a designated exposure control area where formaldehyde or formalin is handled and the amount of formaldehyde in the air is above the permissible limits. This exposure control area will be in effect until [date].”

Labeling formaldehyde/formalin containers



21

“Any product containing more than 0.1 % formaldehyde must be labeled as such. So that means we can’t pour or use any of our formaldehyde-containing products in unlabeled containers.”

How to Protect Yourself

Wear respirators assigned to you,

Wear gloves and goggles or face shield if working with formalin,

Be sure the provided eyewash is functioning properly.



22

“Remember, you must wear a respirator in designated “exposure control areas” – the areas with the warning signs.

If you will work in these areas you’ll need to follow our respirator program specifications before you can be issued a respirator. Program specifications require medical evaluations, fit-testing, training, and proper use and care.

you’ll need to wear eye and hand protection when handling formalin. We’ll provide you training on what types of eye protection and chemical gloves to use and how to properly use and care for them. [see DOSH training kits on both eye and hand protection on the DOSH website]



Cover or cap containers when they aren’t in use. This helps prevent unnecessary vapor exposure and helps prevent spills .”

How to Protect Yourself

To prevent inhaling formaldehyde, make sure your respirator fits properly before entering an area where formaldehyde vapors exist.

If you think your respirator is leaking, leave the area immediately and have it re-fitted, repaired or replaced.

If you know or believe you have inhaled formaldehyde, let your supervisor know immediately.



23


“As we mentioned earlier, formaldehyde has a pungent odor which most people detect at a level just above the permissible limit. If you can smell it, it probably means you have been overexposed to it. If you smell it while wearing your respirator, then your respirator is leaking and either needs to be fit properly or the reason for the leak determined.”

How to Protect Yourself

In the case of large spill or release of formaldehyde:

- Leave the area immediately,
- do not attempt to clean up the spill,
- notify your supervisor.

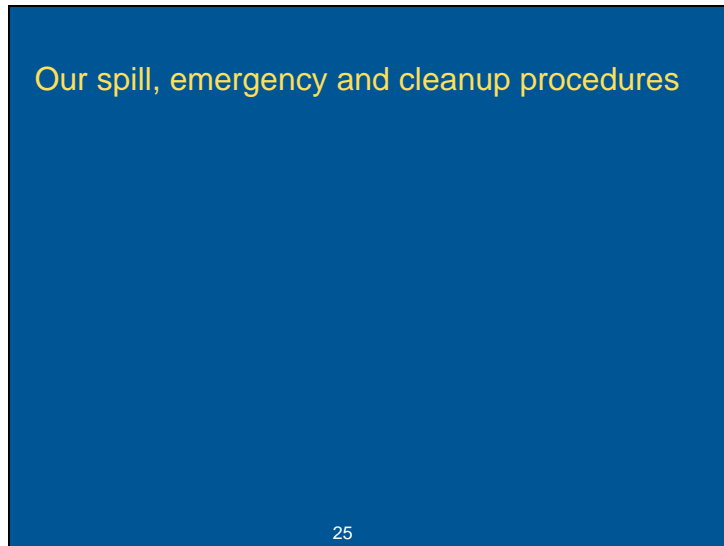
Note: small spills can be clean up with a formaldehyde spill kit similar to the one in this photo.



24

“Do not remain in the release area. If you are required to clean-up minor spills, you will receive additional training through our Hazard Communication program training. If formaldehyde is spilled on you immediately wash it off with water. If you think you may have inhaled formaldehyde in the incident, we will make a medical exam available to you.

If we had a significant spill or release, we are required to make sure the amount of formaldehyde in the air are below the permissible exposure limits, which we would do by air monitoring”.



[Employer: provide and discuss your workplace emergency and cleanup procedures here including the specific duties or assignments each employee in the event of an emergency.]


Medical Monitoring

When is medical monitoring needed?

A medical exam will be made available to you at no cost if you are exposed to formaldehyde above 0.5 ppm over 8 hours or above 2 ppm in any 15 minute period.

The medical exam includes a complete physical exam with emphasis on the skin and the respiratory system.

The medical exam will also be made available to you if you develop eye, respiratory or skin irritation or sensitization while working with formaldehyde



26

“We are required to make a medical exam available to you even if you wear a respirator. The purpose of the medical exam is too make sure you are not having any health problems from exposure to formaldehyde. Medical exam are also made available if a large spill or other emergency exposure occurs.



0.5 (one half) ppm is the “action level” amount of formaldehyde in the air. We have passed out a copy of what must be included in the medical evaluation.”

Temporary Medical Removal

If abnormalities show up in the medical exam, the doctor may ask for additional tests and temporary removal from your current job.

In that case, we will find other work for you in an area where you are not exposed to formaldehyde.

You do not lose any earnings, seniority or benefits during the removal time.



27

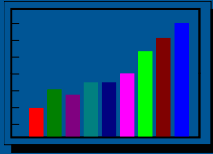

“If medical removal is recommended by a healthcare provider, you will receive a followup exam within 6 months of the first exam. The healthcare provider will determine if you can return to your original job. You also have the right to seek a second and even third opinion from another healthcare provider of your choice.”

Medical and Air Monitoring Records

You have the right to see any of your medical records related to formaldehyde.

These medical records will be kept for 30 years.

You also have the right to see results of any air sampling for formaldehyde we have done.

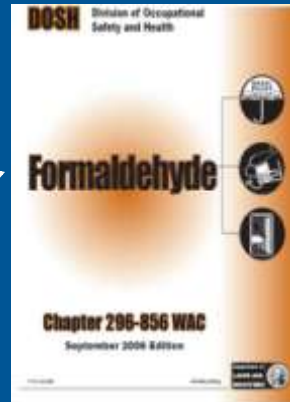


28

“Medical records are kept at [name location] and you can see them at anytime. No one else may view these medical records without your consent.” [Employer: If you have any records of air samples taken at the job site, inform your employees where these results can be viewed or post them, or give copies to affected employees.]

Formaldehyde Regulations – WAC 296-856

For more details, click on this image to view the complete Formaldehyde Standard. →



Additional Resources and Information

National Funeral Directors Association (NFDA) – [Formaldehyde Best Management Practices](#)

NFDA - [Recommendations for Effective Preparation Room Ventilation](#)

EPA – [Formaldehyde in public schools](#)

NIOSH – [Controlling Formaldehyde Exposures During Embalming](#)

IRRT – [Exposure to Formaldehyde in Wood Furniture Manufacturing](#)

California Dept. of Public Health – [Formaldehyde](#)

Oregon OSHA – [Hazard Alert: Hair Smoothing products and formaldehyde](#)

“A short quiz follows this slide to check your understanding of the information we just presented to you.”

Quiz
Question # 1

Formalin is:

- a) a chemical used only in labs
- b) formaldehyde mixed in water
- c) a concentrated type of formaldehyde
- d) formaldehyde in a gaseous state

b) Is the correct answer

Quiz
Question # 2

Exposure to formaldehyde can result in the following health effects:

- a) mainly eye, nose and throat irritation
- b) eye, nose & throat irritation and cancer of the nose and throat
- c) severe respiratory damage at 50 parts per million
- d) mainly skin irritation and eye injury

b) Is the most accurate answer. c) is also correct.

Quiz
Question # 3

An eyewash is required:

- a) wherever concentrated formaldehyde is handled
- b) whenever safety goggles are not available
- c) within 100 feet of where formaldehyde is handled
- d) whenever a product has more than 0.1% formaldehyde is handled

d) is the correct answer.

Quiz
Question # 4

Medical monitoring is required:

- a) whenever you handle formalin
- b) whenever the amount of formaldehyde in the air is over 0.5 parts per million in 30 minutes
- c) whenever a person develops sensitization while working with formaldehyde
- d) none of the above

c) is the correct answer.